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CONTRIBUTIONS TO THE HERPETOLOGY OF SAO PAULO, BRAZIL.—I.

BY DR. H. VON IHERING.

In the State Museum under my administration, I have recently arranged and studied collections of great scientific value illustrative of the fauna of the State of Sao Paulo.

Of the collections made in Brazil by T. Natterer, the mammals and birds have been studied by the naturalist Pelzeln, of the Vienna Museum, forming an important contribution to our knowledge of the fauna of Sao Paulo. Of the other groups of vertebrates but little is known. For example, our largest fresh water fish, the *jahu*, has not been described.[1]

Concerning the reptiles and amphibians of Sao Paulo very little is known. Boettger[2] has mentioned a few species.

In the present paper I offer a list of the reptiles of Sao Paulo, excluding snakes, of which, as well as of frogs, I have lately received many species not yet determined. Of the following list two species only, *Prionodactylus* and *Heterodactylus*, are not represented in the collection of the Museum Paulista.

CROCODILIDÆ.

1. **Caiman latirostris** Daud.

CHELYDIDÆ.

2. **Hydromedusa maximiliani** Gray.
3. **Platemys spixii** D. & B.
4. **Platemys wagleri** D. & B.

This species was found at Piracicaba. The plastron is red. The species seems to be a *Platemys* and not a *Hydraspis.*

TESTUDINIDÆ.

5. **Testudo tabulata** Walb.

Called "Taboti." I have had a living example, found in the woods of this country.

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[1] I propose for this fish the name *Paulicea jahu.* A description may be found appended to this paper.

[2] *O. Boettger,* Ueber eine neue Eidechse aus Brasilien, Bericht d. Senkenb. nat. Gesellsch., Frankfurt a. M. 1875–'76, pag. 140–143 and Pl.; also *Boettger,* Katalog der Reptilien Sammlung im Museum zu Frankfurt a. M., 1893.

GECKONIDÆ.

6. Hemidactylus mabouia Mor.

Common at Santos, and also in the interior, as for instance at Santa Rita and Piracicaba. It is found in houses and also in the forests. It does not seem that this distribution has been effected by man's agency. In the large city of Sao Paulo I have never seen this Gecko.

IGUANIDÆ.

7. Tropidurus hispidus Spix.[3]

Common at Sorocaba.

8. Enyalius catenatus Wied.

There are two forms in Sao Paulo. One of them may be the true *catenatus* or a closely allied species, having the disposition of the spots and yellow marks somewhat irregular, not existing in all forms as seen in the figures of Spix (Plates XI and XIII). The second form, which I call variety *paulista*, has more affinity with *E. iheringi*, but the position of the nostril is nearer to the end of the snout than to the orbit, quite as in *catenatus*, to which the tibia shows analogy. A dark spot passes from the superciliary region to the upper lip. A series of alternating black spots is contained in the obscure vertebral band. Two large yellow lateral bands exist as well as in *E. iheringi*. This may be, therefore, a local variety of *iheringi*, but differs in some characters. Moreover, the dark spots of the face and of the extremities, especially of the lower legs, seem to be characteristic of *paulista*, and wanting in *iheringi*. As I had already doubts of the specific validity of *iheringi*, and as the new variety is intermediate between *iheringi* and *catenatus*, I believe that both are mere varieties of the latter.

The description above given refers to the female, the male being green without marks or spots, and not purplish as Boulenger says.

Enyalius is not at all common and it will, therefore, be impossible to obtain a sufficient representation for more conclusive studies for some time.

9. Anisolepis grilli Blgr.

Sao Paulo, St. Rita.

10. Urostrophus vautieri D. & B.

Sao Paulo, St. Rita.

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[3] I have *Tr. torquatus* Wied. from Rio de Janeiro, but that species seems to be wanting in Sao Paulo.

11. **Polychrus acutirostris** Spix.

ANGUIDÆ.

12. **Ophiodes striatus** Spix.

Sao Paulo.

13. **Ophiodes intermedius** Blgr.

Santos.

14. **Diploglossus fasciatus** Gray.

Santos.

TEIIDÆ.

15. **Tupinambis teguixin** L.

This is the common "lagarto." It was by error that Boettger mentioned *T. nigropunctatus*, from Sao Paulo, as this seems to be the Amazonian form, as Boettger himself corrected.

16. **Tupinambis rufescens** Günth.

I do not know the exact habitat of our example of this species, which seems proper to the western parts of the interior. The number of ventral scales is somewhat less than in Argentine examples. The unicolored under side of the tail distinguishes this species very well from the two others.

17. **Centropyx paulensis** Bttg.

Taubaté.

18. **Ameiva surinamensis** Laur. (*Ameiva ameiva* L.).

Santa Rita.

19. **Pantodactylus schreibersii** Wiegm.

20. **Prionodactylus quadrilineatus** Bttg.

21. **Cercosaura ocellata** Wagl.

Also from the State Paraná.

22. **Placosoma cordylinum** Tsch.

Santos, Raiz da Serra, Paraná.

23. **Heterodactylus imbricatus** Spix.

Serra da Mantiqueira.

AMPHISBÆNIDÆ.

24. **Amphisbæna alba** L.

25. **Amphisbæna vermicularis** Wagl.

The number of the annuli of the body in the examples examined is: 217, 223, 224, 247. The suture of the frontals in one is longer, in two shorter than the suture between the præfrontals, and in one subequal. There are only three upper labials, only one example having four. Of course there is no reason for separating as species the southern examples distinguished by the smaller number of annuli and which only form a variety (*darwini* D. & B.) of the well known species.

It seems not at all justifiable to separate as " species " each example with a somewhat aberrant conformation of the head plates. As is the case with the anal pores (2 or 4), and the upper labials (3 or 4), the ocular also may occasionally be divided. *Amphisbœna angustifrons* Cope, and *mildei* Peters, are abnormalities of this kind of *Amph. darwini*, and not species. In one of my examples a suture in the third upper labial forms on the one side an infra-ocular.

26. **Lipidosternon microcephalum** Wagl.

Santos, Cubatad.

SCINCIDÆ.

27. **Mabuia dorsivittata** Cope.

Sao Paulo.

28. **Mabuia agiiis** Raddi.

Santos.

29. **Mabuia frenata** Cope.

Piracicaba, St. Rita.

This is the provisional list of the S. Paulo species. *Hoplocercus spinosus* Fitz., mentioned by Boulenger from St. Paul, may have come from another South American St. Paulo, not of this State, as species of *Crocodilurus* and *Neusticurus*, do not occur here.

I believe it necessary to make some observations on the distribution of the Lacertilians. Our list contains 24 species of which 2 (*Centropyx* and *Prionodactylus*) as hitherto known only from Sao Paulo, may be left out of the discussion. Three of these species:—*Tupinambis teguixin*, *Ophiodes striatus*, *Amphisbœna vermicularis*, with var. *darwini* are of very broad distribution, extending from north to south Brazil and to Paraguay ; eight of the species also occur in Rio Grande do Sul including *Enyalius catenatus* with its varieties, and *Anisolepis grilli* with its southern representative *A. undulatus*. The genera *Enyalius*, *Anisolepis*, *Urostrophus* and *Pantodactylus* represented in Rio Grande do Sul as well as in Sao Paulo, are not known at this time from Paraguay. It seems to be the same with

Hemidactylus, Mabuia[4] and the species of *Placosoma, Heterodactylus,* etc.

As future studies may modify these results it is sufficient here merely to touch on the problems of distribution. In general we have besides the more widely distributed forms to distinguish (1) forms of the littoral of Brazil, and (2) forms of the Paraguay valley, extending to Brazil.

I have already mentioned the former group. We can subdivide it into species developed principally to the north or to the south of the tropic of Capricorn. *Pantodactylus schreibersi* has not hitherto been found north of Sao Paulo; *Diploglossus fasciatus* is a Bahia form, which I have received from Rio Janeiro and Santos. There are many other species not represented in the interior of Sao Paulo, which extend in the coast end of Santos and further southward. Santos is situated on the ocean, S. Paulo 40 miles higher; the annual temperature of Santos, Iguape, being 21,5°, of S. Paulo 18,3° centigrade.

Thus it is quite natural that in the lowland between the ocean and the coast range, the Bahia fauna extends much farther south than in the interior. It seems probable that *Amphisbœna alba, Placosoma cordylinum,* etc. are governed by the same condition, and this will be much more evident from the numerous north Brazilian types represented in our collections from Santos and Raiz da Serra. But I can refer to another instructive instance: One of the characteristic families of the subtropical zone is that of the *Boidæ,* represented in Bahia by four species of which only *Epicrates cenchris* does not seem to reach Rio. *Eunectes murinus* is common in the interior of S. Paulo and extends to the south of St. Catharina as I have examined a skin from Laguna. It is gradually disappearing, and was once represented also in Rio Grande do Sul, as I believe *Boa constrictor,* not rare in the interior of Sao Paulo, does not occur in Rio Grande do Sul. I very much doubt the record "Buenos Ayres" in Boulenger's Catalogue. Species of *Boa* and *Eunectes* also occur in Paraguay but they are perhaps not exactly determined, and may be mere varieties of the eastern species.

I have received specimens of *Carollus caninus* L. from Rio and from Santos.

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[4] This exists in St. Catharina and perhaps the north of Rio Grande do Sul, but has not hitherto been found in Rio Grande.

Another fact on which I insist is the distribution of certain forms from northern Brazil to the La Plata River, with the exclusion of the Brazilian littoral. The genus *Boa* is an example of this. *Ameiva surinamensis* does not exist in Rio Grande do Sul, but is said to live in the La Plata region, also in Bahia and in Paraguay. In Sao Paulo, however, this species is rare, and represented in the western zone only. Here we have also *Tupinambis rufescens*, extending from Mendoza to western Sao Paulo and *Mabuia frenata*, a Paraguayan species, which we have received from St. Rita and Paracicaba.

The species of *Mabuia* have an interesting distribution. As we mentioned above, the Paraguayan species *M. frenata* exists in the western parts of Sao Paulo. From Santos I have *M. agilis* Raddi, known hitherto only from Rio and north of Rio, but on the central highland we have *M. dorsivittata* Cope, extending from Rio Grande do Sul to Paraguay and to Sao Paulo. *Tropidurus torquatus* and *Polychrus acutirostris* are Brazilian species, distributed from Bahia to Sao Paulo and extending to Paraguay. It should be possible by this time, to determine analytically the various regional components of the diverse faunas.

I have elsewhere discussed these problems in distribution, having been the first to direct attention to them. In a paper on the distribution of *Ampullaria* I have mentioned, that of the species common to the Amazonian and San Francisco region, *A. canaliculata* does not occur in St. Catharina, *A. sordida* being substituted for it. Also at Rio Janeiro and in Sao Paulo there are other species of *Ampullaria*. This is only one example from a great list of species. *Glabaris riograndensis*, etc. are not represented in the River Paraná system, but are common in Rio Grande do Sul. Besides the species common to the Paraná system and to Rio Grande do Sul, there are others which reached Rio Grande and the La Plata States by the Paraguay system. This is now separated from the Amazonian system, but the faunal identity demonstrates this separation to be of very recent date.

The distribution of neither the fresh-water nor of the land faunas of Brazil can be at all understood without reference to these facts. For instance there is *Bulimus* (*Borus*) *oblongus* Müll., a form common in Rio Grande do Sul and the La Plata region, but also in Bolivia, Guiana and Venezuela. From St. Catharina to Sao Paulo and Rio where this species does not occur, *B. ovatus* Müll. is substituted for it, and north of Rio *B. cantagallanus* Rang takes its place. From Sorocaba, Ypanema, etc. I have received *B. ovatus*, but in Piracicaba and St. Rita in the western zone we have *B. oblongus*, which is evidently an immigrant from Paraguay, Bolivia, etc. with many of our other *Bulimus* and *Helix*.

The same conditions are noticed in other land shells. We find identity of species from Bahia with those of the La Plata and Rio Grande do Sul, which are absent from St. Catharina northward on the littoral.[5]

I believe finally it is time for European naturalists to take notice of these studies. It is quite an unscientific method, to continue to consider the neotropical region as a natural unity zoologically. This region in later secondary and early tertiary time was formed by coalescence of an Antarctic and a tropical element, the latter having been in mesozoic time connected with Africa. It was only with the pliocene period[6] a connection with North and Central America was formed. The ancient West Indian bridge being only during pleistocene time replaced by the present Isthmus of Panama.

We know to-day the history of the South American mammals, being able to separate the ancient endemic element from the pliocene immigrants. In herpetology this is not the case, nor may we expect fossil material so abundant. Here zoogeographical data may help. Thus, I believe, no one could understand the geographical distribution of *Hyla* without supposing it a pliocene immigrant to Brazil from the north. We may be sure that *Hyla* or its allied forms will never be found in South America in the older tertiary formation. Taking *Hyla* as a northern intrusive element which passed by way of Central America to the Amazonian region and southward, we may easily understand the complete absence of these tree frogs from the Chilian forests. The Andean barrier of Chili and Peru is a very old one, and that of Ecuador a very recent one. This explains the fact hitherto not observed, that the Cordilleras are a zoological dividing line in Chile and Peru, but not in Ecuador. It seems to me quite probable that the American *Teiidæ* and *Iguanidæ* are originally from South America, and the *Solenoglyphæ*, *Boidæ*, etc. from North America.

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[5] My various papers referring to the distribution of the Brazilian fauna and to the history of the neotropical region are as follows. The last three treat of the subject more fully:

Revision der von Spix in Brasilien gesammelten Najaden. Arch. f. Naturg. 1890, p. 117–170. Taf. IX.

On the ancient relations between New Zealand and South America. Trans. of the New Zealand Instit., Vol. XXIV, 1891, p. 431–445, (cf. Ausland, 1891, No. 18).

Die geographische Verbreitung der Flussmuscheln. "Ausland," Stuttgart, 1890, No. 48 and 49 *cf.* The New Zealand Journal of Science, 1891, p. 151.

Die geographische Verbreitung der Ampullarien in südlichen Brasilien. Nachrbl. d. Deutch. Malak. Ges., No. 5 and 6, 1891.

Anodonta und Glabaris. Zoolog. Anzeiger, No. 380–381, 1891–'92.

Ueber die Beziehungen der chilenischen und südbrasilianischen Süsswasserfauna. Verhandl. d. deutschen wissensch. Vereines zu Santiago, 1891, II. Bd., p. 143–149.

Morphologie und Systematik des Genitalapparates von Helix. Zeitschr. f. wissensch. Zool., Bd. 54, 1892, p. 386–520, Taf. 18–19 (cf. p. 489, Geograph. Verbreitung).

Das neotropisch Florengebiet und seine Geschichte. Botan. Jahrbücher. Engler. Bd. 17, 1893, p. 1-54.

Najaden von Sao Paulo und die geographische Verbreitung der Süsswasserfaunen von Südamerika. Archiv. f. Naturgesch., 1893, p. 45–140, Taf. III and IV.

Die Ameisen von Rio Grande do Sul. Berliner Entomolog. Zeitschr. Bd. 39, 1894, p. 321-446.

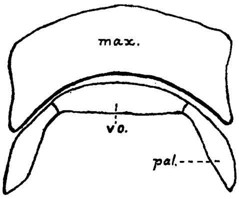
[6] And if in contrast to my opinion Ameghino is right, there was a connection also in the beginning of the tertiary period, followed without doubt by a long time of separation of both Americas.

It is not my intention to fully discuss these questions here; I would only call attention to them as new problems which we have to solve.

DESCRIPTION OF A NEW FISH FROM SAO PAULO.

PAULICEA gen. nov.

Head broader then deep, flattened, with the upper jaw little projecting beyond the lower, covered with skin, granulated behind. Occipital process reaching the dorsal plate. Dorsal spine nearly equidistant from snout and adipose fin. Pectoral spine long, broader than the dorsal spine, serrate behind. D. I–6. Caudal not deeply forked. Villiform teeth on upper jaw, palate and vomer. Palatine teeth forming with the vomerine patches a shallow band immediately behind the intermaxillary band of teeth, which is broad and scarcely or not at all narrowed in the middle.



Maxillary, vomerine and palatine teeth of *P. jahu.*

P. jahu sp. n.

A large species reaching a weight of 100 Kilo. and a length of 1.5–1.8 M. Width of head at the mouth two-thirds of its greatest width. D. I–6. A. I-10. Adipose fin equal to the anal fin. Maxillary barbel short, somewhat flattened, not longer than the head. Dirty gray with indistinct dark spots on back and sides.

There is in Sao Paulo in the rivers of the Rio Paraná system, especially in the system of the Rio Tieti, only one other fish which attains the dimensions of the Jahu; this is the *Pseudoplatystoma coruscans* Ag., called Piracampacú. I got both at Piracicaba. The genus *Paulicea* is identical with the nameless genus No. XXXII, of C. H. and R. Eigenmann,[1] a genus which contains besides the new species here described, one Amazonian species *P. lutkeni* Steind., described as *Platystoma.*

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[1] A review of the South American Nematognathi, San Francisco, 1890, p. 201.